① Find any local and absolute extrema of $f(x)=x^3-12x-5$

② Discuss the slope of $y=x^3$ on the interval $(-\infty,\infty)$.
Be as detailed as you can

$y'=3x^2-12$

$0=3x^2-12$

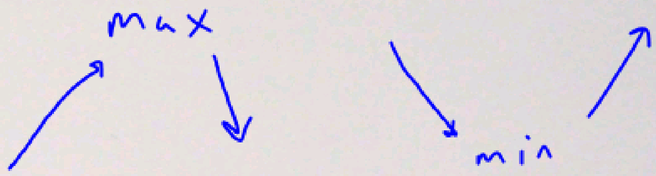
$12=3x^2$

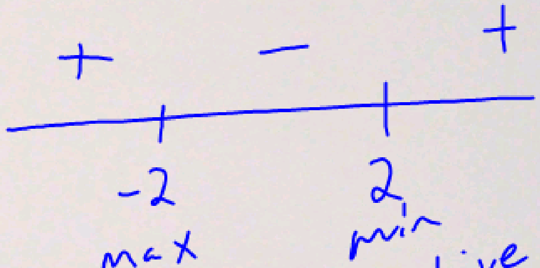
$4=x^2$

$\boxed{x=-2 \text{ and } 2}$

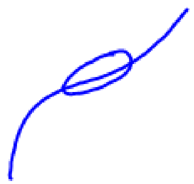
max   min

$y''=6x$



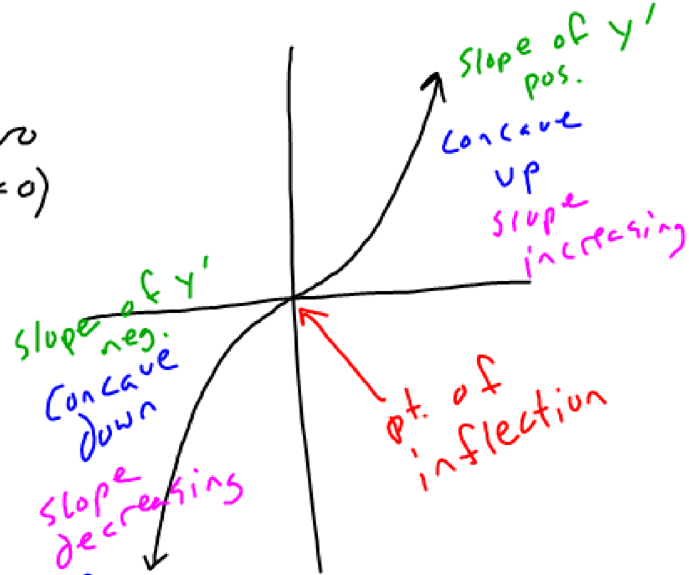


1st derivative test for local extrema



$y = x^3$

- From both sides, as we approach zero, slope decreases
- As we move away from zero, slope increases
- Always positive slope, or zero ($x=0$)



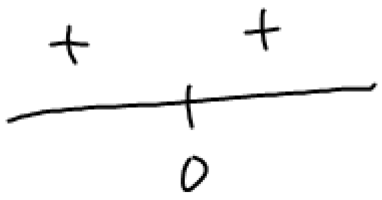
- 2^{nd} derivative can tell us about the change in slope

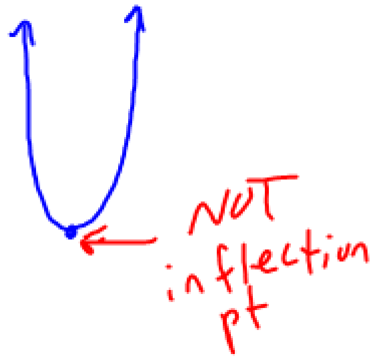
- if $\underline{y'' > 0}$ then slope of orig. function is increasing
  concave up!
- if $\underline{y'' < 0}$ then slope of orig. function decreasing
  concave down!
- if $y'' = 0$, possible inflection

$\boxed{\text{WARNING}}$

• 2^{nd} derive could be zero at non-inflection pt.

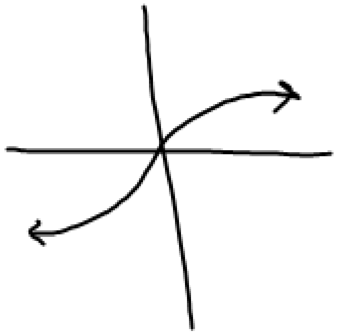
$f(x) = x^4 \qquad f''(x) = 12x^2 \qquad f''(0) = 0$





• we could have inflection point when y'' is undefined

$y = \sqrt[3]{x}$

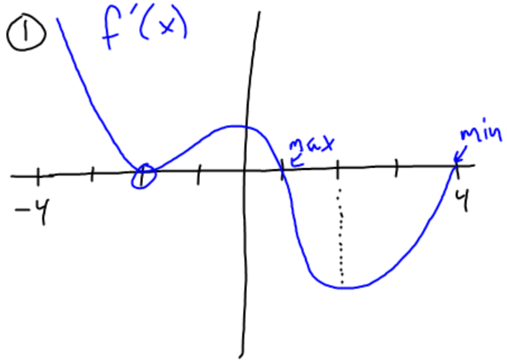


vert. tangent at $x=0$

- 2^{nd} derivative test for local extrema

if $f'(x)=0$ and $f''(x)>0$ then we get a local min.

if $f'(x)=0$ and $f''(x)<0$ then we get local max

① 

ⓐ over what interval is $f(x)$ increasing?

a: -4 to 1

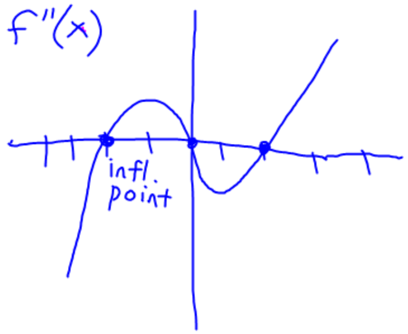
$[-4, -2) \cup (-2, 1)$

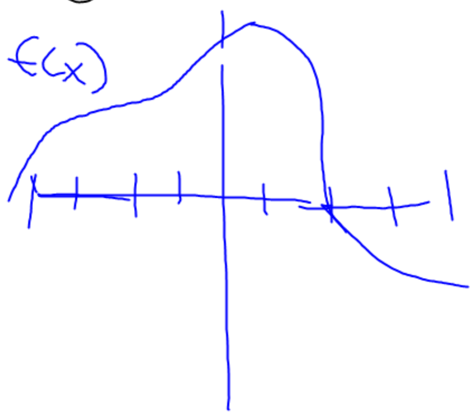
ⓑ over what interval is $f(x)$ concave up $(-2, 0)$ $(2, 4]$

ⓒ where are there local extrema, are they max/min? (of original function)

ⓓ Find x-coord. of inflection pts.

ⓔ sketch $f(x)$





Read 4.3

- Do #2, 6, 7, 10, 11, 14, 16, 19, 21, 24

- Do real weekly review 6 for Friday